CHAPTER 3
Affected Environment

3.1 Introduction

This chapter describes the existing environmental media that could be affected by implementation of the No-Action Alternative, Alternative A, or Alternative B.

3.2 Noise

Noise and sound can affect well being. High levels of noise can cause hearing loss, interfere with communication, disturb concentration, and cause stress. Moderate and low levels of noise can disturb sleep and annoy sensitive receptors.

3.2.1 Noise Criteria and Regulations

Generally, environmental noise regulations, ordinances, guidelines, and other criteria are established for two reasons: (1) to protect existing residents from the potential impact of new noise sources, and (2) to protect new residents from existing noise sources. The guidelines from the US Environmental Protection Agency (EPA), found in its "levels" document (EPA, 1974) and those found in most municipal noise ordinances (Gatley, 1979), address the first reason. Guidelines from the US Department of Housing and Urban Development (HUD, 1983) and from the US Department of the Air Force, found in its *Air Installation Compatible Use Zone* (AICUZ) Program (USAF, 1999), concentrate on the second reason.

The guideline from the EPA recommends an equivalent sound level day/night (DNL) of 55 dBA to protect the health and well-being of the public with an adequate margin of safety. Many municipal noise ordinances limit noise emitted from a property to 60 dBA. Guidelines and requirements from HUD and USAF give tables of compatible use categories based on existing DNL levels. For example, both HUD and USAF use 65 DNL as the upper limit for acceptable residential development without added noise reduction.

The Tennessee Valley Authority generally uses the EPA guideline of 55 dBA DNL at the nearest residence and 65 dBA at the property line in industrial areas, when no resident is nearby. In addition, TVA uses the Federal Interagency Committee on Noise (FICON, 1992) recommendation that a 3 dB increase indicates possible impact, requiring further analysis when the existing DNL is 65 dBA or less.

3.2.2 Effects of Noise Exposure

Hearing Loss

Exposure to high noise and sound levels can cause hearing loss. The Occupational Safety and Health Administration (OSHA) regulates noise exposure in the workplace. Similarly, the EPA gives guidance for exposure to environmental noise. The EPA recommends an average annual exposure limit of 70 dBA equivalent sound level for 24 hours (Leq[24]) over 40 years to prevent hearing loss. The OSHA exposure standard is 90 dBA for 8-hour exposure (OSHA, 1984).

Communication

Communication interference begins at background noise levels much lower than levels that can cause hearing loss. Sentence intelligibility is one method of determining communication interference when background or intruding noise is broad spectrum. This is usually the case when there are multiple noise sources. In the EPA's Information on Levels of Environmental Noise requisite to Protect Public health and Welfare with an Adequate Margin of Safety (commonly referred to as the "levels" document), Figure D-1 shows that there is 99 percent sentence intelligibility for normal voice communications when the background noise is 54 dBA, or less, and 100 percent at 45 dBA or less. This corresponds very well with the presentation in Harris, Figure 16.8, which shows "just-reliable" normal voice communication can occur at background noise levels as high as 60 dBA and "highly reliable" communication at 6 dB less (Harris, 1991). Other methods of estimating communication interference, such as the speech interference level (SIL), are applicable to indoor environments when octave band analysis of background and intruding noise is available (USAF, 1995).

Disturbance

Noise can either disturb or aid concentration depending on its characteristics. Even moderate levels of intruding noise can be distracting if it is sporadic, has a dominant frequency, or is identified with an undesirable source. Ironically, the same level of white-noise (masking sound used to block undesirable background noise) helps people concentrate. Where good listening conditions are required, Table 17.1 in Beranek (1992), presents recommended, maximum background noise levels of 38 to 48 dBA for private offices, classrooms, small conference rooms, and libraries. Harris (1991) gives similar recommendations that range from 38 to 43 dBA for private offices and 43 to 48 dBA for libraries.

Recommended background noise levels for bedrooms in private residences, apartments, hotels, and hospitals are also found in the tables listed above. Beranek (1992) lists 38-48 dBA and Harris (1991) 33-38 dBA as maximum levels in rooms of sleeping. The low end of the Harris recommendation is just 3 percent of the sound energy of the high end of the Beranek range. This is a substantial difference. A discussion in the EPA "levels" document acknowledges that sleep disturbance from noise is highly subjective. As with disturbing concentration, the characteristics of the background or intruding noise are as much of a concern as the level of noise, and there can be a wide variation in noise levels that disturb different people.

Annoyance

Annoyance from intruding and background noise is highly subjective. There are several studies that have used population surveys to correlate annoyance and noise exposure. Much of this research was done around airports and other transportation related noise sources. The 1980 guidelines published by the Federal Interagency Committee on Urban Noise presents a table that estimates the percentage of residential population that would be highly annoyed from a range of background noise (FICON, 1980). The following table gives those estimates along with the average community reaction description that would be expected.

Table 3.2-1 Estimated Annoyance from Background Noise		
DNL (dBA)	**Percent Highly Annoyed**	**Average Community Reaction**
75 & above	37	Very severe
70	25	Severe
65	15	Significant
60	9	Moderate to slight
55 & below	4	

Similar annoyance information is given in Harris (1991). This is based on work accomplished by Fidell (1979) that relates annoyance to DNL levels in the following quadratic equation.

$$\text{Percent Highly Annoyed} = 0.036(\text{DNL})^2 - 3.27(\text{DNL}) + 79.14$$

This relationship gives estimated annoyance percentages of 8, 13, 19, 27, and 36 when the same DNL values in the table above (55 and below through 75 and above), are used.

3.2.3 Baseline Noise

Aircraft flying over, flightline operations, and maintenance activities are the predominant noise sources on and around CAFB. Vehicle and commercial activities add to the background noise in the immediate area of the mobile home park site. Aircraft and support operations are generally active from 6 a.m. to 11 p.m. Monday through Thursday, from 6 a.m. to 9 p.m. Friday, and are not active Saturday or Sunday under typical training schedules (Waller, 2001).

The Air Force has modeled aircraft operations noise in the area using the NOISEMAP program. The modeling calculated that the mobile home park site (Alternative A) has a DNL of between 65 and 70 dBA (Smith, 2001). Nearby sensitive receptors include about 100 mobile home residences in the rest of the park, immediately adjacent to the site on the west and south, and several hundred CAFB family housing units located about 500 feet to the southeast.

According to the NOISEMAP modeling, the DNL at the wastewater treatment plant (WWTP) site (Alternative B) is also between 65 and 70 dBA (Smith, 2001). Nearby sensitive receptors include the CAFB Family Support Center, about 400 feet north of the WWTP site, and the base hospital 300 feet further north. The golf course begins about 500 feet east, and the entomology laboratory is about 400 feet to the northwest.

3.3 Land Use

The site of Alternative A is within an existing privately-owned mobile home park. The park contains about 125 homes and is about 25 acres in size. The mobile homes are generally 12 to 14 feet wide and approximately 65 to 70 feet in length. Most of the mobile homes are occupied by unaccompanied base personnel, but there are some families, and some of these include children. The park residents are generally short-term occupants, with an average residence time of approximately three years. In the central part of the park, there is an undeveloped open area about four acres in size which is probably used for informal recreation by the residents. Immediately adjacent to the park on the north are the TVA substation and the CAFB golf course,

with the rest of the base to the north and east. Immediately to the east of the park is an approximately 50 acre area of base housing for accompanied base personnel. Air Force personnel are typically housed in this area for two years. The housing units are of moderate size and construction. Immediately west of the park lies a mixed strip commercial and residential area running north-south along Highway 373. The mobile home park and the surroundings are not in an incorporated community, and there is no applicable zoning or land use plan for the area. Scattered commercial and residential development (much of it mobile homes), lie within about a mile of the site to the south and east. Beyond that the area is very rural in mixed agricultural and forest use. To the west, beyond the strip of development along Highway 373, the land is nearly totally forested, extending to extensive bottomland hardwood wetlands along the Tennessee-Tombigbee Waterway

The site of Alternative B is about 1200 feet northwest of the site of Alternative A on CAFB property just inside the south gate and about 400 feet west of Highway 373. All of the site is vacant, and part of it is the site of the former CAFB Wastewater Treatment Plant. As noted above, the CAFB Family Support Center is about 400 feet north of the site, and the base hospital 300 feet further north. The entomology laboratory is about 400 feet to the northwest, and the golf course begins about 500 feet east. The base's State Village Family Housing Area lies about 1100 feet north of the site.

CAFB has a general plan that details existing and future land use. The 12 land use categories include these: airfield and direct mission; aircraft operations/maintenance facilities; industrial facilities; community (commercial facilities); community (service) facilities; recreational facilities; medical, dental, and veterinary; housing (unaccompanied) officer; housing (unaccompanied) airmen; housing (accompanied); administrative; and transportation, open areas, buffer areas, and undesignated areas (USAF, 2001). The Alternative B site is categorized as industrial facilities based on the former presence of the wastewater treatment plant.

The site lies in the southwest corner of the base. Adjacent to the west is undeveloped forested land which extends west to extensive bottomland hardwood wetlands along the Tennessee-Tombigbee Waterway.

Additional descriptive details of the area surrounding these sites can be found in other sections below, most notably 3.4 and 3.8.5.

3.4 Visual and Aesthetics

In the mobile home park the topography is relatively flat and drains toward the northeast. The paved park road encircles a rectangular open lawn area of about four acres. There are a few streetlights on utility poles along the drive and the lawn area. Mobile homes are located along both sides of the drive except the north section, which has two frame houses on one side and a TVA substation on the other. A few trees are scattered among the homes, and some lower vegetation toward the northeast provides occasional ground level screening. Scenic attractiveness is low. However, the open residential character provides a relatively tranquil sense of place for the transitory population. Adjacent one-story brick and wood units in the base housing area are screened from the mobile home park by a board fence and mixed vegetation.

The site is visible from CAFB to the north through scattered trees and the substation. It can be seen in the foreground from the golf course by motorists passing on C Street, and by southbound traffic on the highway. It is partially visible from the dormitory area to the northeast

and from the clinic area more distant to the northwest. The site is visible from residential areas just south of the base. Incidental views from the highway are also likely.

The visual character immediately west of the site and outside the base is a discordant mix of residential and commercial buildings generally one or two stories high. A variety of stores and businesses are located along the highway that approaches the gate from the south. There is a mixed assortment of building styles and materials. Scattered trees and lawns are visible among various types of homes seen near the road.

The visual character at the Alternative B site inside the gate has a suburban appearance and residential scale. Large trees line one side of Highway 373 as it continues through the base. Broad, open grass areas with recurrent groups of trees are visible across the golf course, along roadways, and on the building grounds. Dormitories and community buildings in the area are generally two stories or less. Architectural materials are similar, and most buildings are visually compatible. Together, the natural and cultural elements form a relatively harmonious suburban landscape in this section of the base. Administrative and industrial facilities in other sections of the base have a different visual character with larger structures and denser development. Large, light-colored storage tanks and a water tower can be seen to the east and visibly contrast with this area.

Former features of the WWTP included two concrete storage tanks, aeration basins, and several one-story concrete block buildings. The small-scale facility was visually compatible with other structures nearby. The remaining two acres of the site outside the fence is generally open grass, with a several groups of large trees to the east and fewer to the north. Vegetation provides very little ground-level screening. A gravel access road is located along the south side, and adjacent mixed woodlands border the area to the south and west. The site is relatively flat with divided drainage to the west and a creek along the southeast. Scenic attractiveness and tranquillity are moderate. The site area is seen by motorists passing on the highway and westbound on C Street. It is also visible from the golf course and dormitory area to the east, as well as from the buildings and parking area to the north.

3.5 Air Quality

3.5.1 Air Pollutants and Ambient Standards

Air quality in any given region is measured by the concentration of various pollutants in the atmosphere, typically expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu g/m^3$). Air quality is not only determined by the types and quantities of atmospheric pollutants, but also by surface topography, size of the air basin, and prevailing meteorological conditions.

The EPA has established both primary and secondary National Ambient Air Quality Standards (NAAQS) for certain pollutants under the provisions of the Clean Air Act (CAA). Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect the public welfare (i.e., soils, vegetation, and wildlife) from any known or anticipated adverse effects from a criteria air pollutant. The CAA also set emission limits for certain air pollutants, new or modified major sources based on best demonstrated technologies, and established health-based national emissions standards for hazardous air pollutants.

NAAQS are currently established for six air pollutants (known as "criteria air pollutants") including carbon monoxide (CO), nitrogen dioxide, (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and particulate matter equal to or less than 10 microns in aerodynamic diameter (PM_{10}). There are many suspended particles in the atmosphere with aerodynamic diameters larger than 10 microns, collectively referred to as total suspended particulate (TSP).

Although O_3 is considered a criteria air pollutant and is measurable in the atmosphere, it is not often considered as an air pollutant when calculating emissions because O_3 is typically not emitted directly from most emission sources. O_3 is formed in the atmosphere from its precursors, NO_x and volatile organic compounds (VOCs), which are directly emitted from various emission sources. For this reason, NO_x and VOCs are commonly reported in an air emissions inventory instead of O_3.

The CAA requires each state to adopt regulatory requirements necessary to attain the NAAQS. The CAA also allows states to adopt air quality standards that are more stringent than the federal standards. As stated in Mississippi Code, Section 49, Chapter 17, Paragraph 19 as amended, the State of Mississippi has adopted the NAAQS as the Mississippi standards as listed in Table 3.5-1 (USAF, 2001). The ozone 8-hour and $PM_{2.5}$ NAAQS were established by EPA but were judicially challenged. It may be a year or so before the dispute over the validity of these NAAQS is resolved.

3.5.2 Regional Air Quality

The EPA classifies the air quality within an air quality control region (AQCR) according to whether or not the concentrations of criteria air pollutants in the atmosphere exceed primary or secondary NAAQS. All areas within each AQCR are assigned a designation of either attainment or non-attainment for each criteria air pollutant. An attainment designation indicates that air quality within specific areas of an AQCR is as good as, or better than, NAAQS for individual criteria air pollutants or that the air quality is "unclassified." Unclassified indicates that air quality within an area cannot be classified and is therefore treated as attainment. Non-attainment indicates that the concentration of an individual criteria air pollutant at a specific location exceeds primary or secondary NAAQS. Additionally, an AQCR may include locations such as National Parks and Wilderness Areas, which are designated as Class I Areas. Such areas receive special protection under the Clean Air Act because of the importance of their good air quality.

CAFB is located in Lowndes County within the Northeast Mississippi Intrastate AQCR 135. The EPA has designated air quality within Lowndes County as better than NAAQS for SO_2, and unclassified for CO, Pb, NO_2, O_3, and PM_{10}. There are no non-attainment areas in the vicinity of CAFB (USAF, 2001). The nearest Class I Area is the Sipsey National Wilderness Area, about 70 miles to the northeast in Lawrence County, Alabama.

Table 3.5-1
United States and Mississippi Ambient Air quality Standards

Criteria Pollutant	Averaging Time	Primary NAAQS[a,b,c]	Secondary NAAQS[a,b,d]	Mississippi Standards[a,b]
Carbon Monoxide	8-hour 1-hour	9 ppm (10,000µg/m^3) 35 ppm (40,000µg/m^3)	No Standard No Standard	9 ppm (10,000µg/m^3) 35 ppm (40,000µg/m^3)
Lead	Quarterly	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3
Nitrogen Oxides (measured as NO_2)	Annual	0.0543 ppm (100 µg/m^3)	0.0543 ppm (100 µg/m^3)	0.0543 ppm (100 µg/m^3)
Ozone	8-hour 1-hour	0.08 ppm (157 µg/m^3) 0.12 ppm (235 µg/m^3)	0.08 ppm (157 µg/m^3) 0.12 ppm (235 µg/m^3)	0.08 ppm (157 µg/m^3) 0.12 ppm (235 µg/m^3)
Particulate Matter (measured as PM_{10})	Annual 24-hour	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3
Particulate Matter (measured as $PM_{2.5}$)	Annual 24-hour	15 µg/m^3 66 µg/m^3	15 µg/m^3 66 µg/m^3	15 µg/m^3 66 µg/m^3
Sulfur Oxides (measured as SO_2)	Annual 24-hour 3-hour	0.03 ppm (80 µg/m^3) 0.14 ppm (365 µg/m^3) No Standard	No Standard No Standard 0.50 ppm (1,300 µg/m^3)	0.03 ppm (80 µg/m^3) 0.14 ppm (365 µg/m^3) No Standard

[a]National and state standards, other than those based on an annual or quarterly arithmetic mean, are not to be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year, with maximum hourly average concentrations above the standard, is less than or equal to one.

[b]The NAAQS and Mississippi standards are based on standard temperature and pressure of 25ºC and 760 mm or mercury.

[c]National Primary Standards: The levels of air quality necessary to protect public health with an adequate margin of safety. Each state must attain primary standards no later than three years after the state implementation plan is approved by the EPA.

[d]National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain secondary standards within a "reasonable time" after the state implementation plan is approved by the EPA.

3.5.3 Baseline Air Emissions

An air emissions inventory is an estimate of total mass emissions of pollutants generated from a source, or sources, over a period of time (typically, one year). Accurate air emissions inventories are needed for estimating the relationship between emissions sources and air quality. Quantities of air pollutants are generally measured in pounds (lb) per year or tons per year (tpy). All emission sources may be categorized as either mobile or stationary emission sources. Stationary emission sources may include boilers, generators, fueling operations, aerospace ground equipment, industrial processes, and burning activities, among others. Mobile

emission sources at Air Force installations typically include aircraft operations, surface vehicle operation, and weapons testing.

Table 3.5-2 contains the calendar year 1998 (CY98) Lowndes County stationary air emissions inventory summary (USAF, 2001). This inventory is an estimate of emissions within the county and includes CAFB permitted stationary and grandfathered emissions, as well as mobile emissions. Lead emission factors are associated with boilers and other sources that burn coal and fuel oil. Because few sources use these fuels, lead emissions tend to be minute. However, they are reported in the inventory.

Table 3.5-2
Baseline Air Emissions, Lowndes County

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NO_x (tpy)	SO_x (tpy)	$PM_{10/2.5}$ (tpy)	Pb (tpy)
CY98 Total:	12,927.8	15,179.6	15,354.6	19,391.2	12,391.3	4.10

Note: VOCs are not a criteria air pollutant. However, VOCs are reported because as an ozone precursor they are a controlled pollutant. $PM_{2.5}$ emissions were not available; therefore, the emissions were conservatively assumed to be the same as PM_{10} (USAF, 2001).

3.5.4 Meteorology

The Air Force Base is located in the Tombigbee and Tennessee River Hill physiographic district of the Gulf Coastal Plain. Nearby terrain is gently rolling with no topographic features that appreciably influence the weather. The climate is significantly humid during most of the year with relatively short, mild winters and long, warm summers. Average rainfall is approximately 55 inches per year, with thunderstorms expected on average of 65 days per year. Tropical disturbances, including hurricanes and their remnants, are infrequent (USAF, 2001). This area is, however, prone to tornadic activity. Appendix D discusses the history of tornadoes for central Mississippi.

3.6 Socioeconomic Resources

3.6.1 Demography

According to the 2000 Census of Population, the population of Lowndes County is 61,586. This represents an increase of 3.8 percent over the 1990 population of 59,308. This rate was slightly faster than the growth rate of 3.5 percent from 1980 to 1990, but was well below the rate of increase from 1990 to 2000 for the state (10.5 percent) and the nation (13.2 percent). In 2000, over 42 percent (25,944 persons) of the population of the county resided in the city of Columbus. Columbus experienced a 9.0 percent increase in population from 1990 to 2000. Information concerning the population and distribution of ethnic groups is included under Section 3.13.2.

3.6.2 Housing

A 1999 analysis of housing in the city of Columbus estimated an inventory of 10,248 units in the city (USAF, 2001). The same study estimated that rent for a 2-bedroom apartment in Columbus ranged between $275 and $500 per month, with a median of $400 per month. For a 3-bedroom unit, rents ranged from $475 to $1,200 per month, with a median of $600 per month. The 3-bedroom units are mostly houses or other single-family dwellings.

In this same analysis, estimated average sale price for single-family homes in the area was

$93,781. This estimate was based on listings in the Golden Triangle Association of Realtors' Multiple Listing Service and, therefore, may not include all home sales in the area. The Golden Triangle area includes Starkville (Oktibbeha County) and West Point (Clay County), as well as Columbus.

3.6.3 Education

At the end of the 1999-2000 school year, 10,888 students were enrolled in public schools in Lowndes County and 1,417 students attended private schools in the county (USAF, 2001). There are two public school districts in the county; Columbus Municipal School District with 5,288 students, and Lowndes County School District which had 5,600 students. There are five colleges and vocational schools within 24 miles of Columbus.

3.6.4 Economy

The civilian labor force in Lowndes County in 2000 averaged 26,420 persons, with an unemployment rate of 5.9 percent. This unemployment rate was somewhat higher than the statewide rate of 5.4 percent. The Lowndes County rate was the same as in 1999, but the state rate was higher than the 1999 rate of 5.1 percent. Services were the largest source of jobs in Lowndes County in 1998, providing 8,211 jobs or 22.8 percent of the total. Manufacturing was next with 6,741 jobs, or 18.7 percent. Retail trade provided 6,546 jobs which was 18.1 percent of the total, and government provided 6,070 jobs, or 16.8 percent. In 1998, personal income per capita was $20,249 (higher than the state average of $19,776). Manufacturing, at 24 percent, was the largest contributor to total earnings in the county, while government was next largest with almost 22 percent.

Poverty data is discussed in Section 3.13.2, at the end of this chapter.

3.7 Water Resources

3.7.1 Surface Water

The primary surface water feature of the CAFB region is the Tombigbee River, now channeled and impounded to form the Tennessee-Tombigbee Waterway. It flows in a southerly direction west of CAFB (USAF, 2001). The Buttahatchie River, one of the Tombigbee's main tributaries, flows west along the northern boundary of the base, about three miles north of the sites. An unnamed intermittent tributary of Stinson Creek, which flows directly into the Tombigbee, flows between the sites of Alternative A and Alternative B. Portions of this unnamed stream appear to have been channeled at some point in the past. The stream serves as part of the storm water drainage system for the base, and in the vicinity of the sites the stream carries water only intermittently. In general, the quality of these surface waters in the area is considered moderate and supports good fishing as well as recreation, wildlife, livestock and crop watering, but it is not used by people for drinking or for industrial activity (other than commercial navigation on the Tombigbee).

3.7.2 Groundwater

Groundwater resources are widely available throughout the project site region. The principal aquifers in descending stratigraphic order include surficial alluvial terrace deposits associated with the Tombigbee River (Pliocene-Pleistocene age), the Eutaw-McShan aquifer (Cretaceous age), and the Tuscaloosa Aquifer System (Cretaceous age). Deeper Paleozoic aquifers are also present in the region; however, characteristics of these aquifers within the locality of the sites are currently unknown.

Alluvial terrace deposits generally consist of unconsolidated sand and gravel with minor amounts of silt and clay. These sediments are essentially flat-lying and have a total thickness of about 20 to 30 feet. Groundwater within the terrace aquifer generally occurs under unconfined conditions. Recent geotechnical drilling at the Mobile Home Park site indicates the water table in the project area lies approximately 14 feet below ground surface (QORE, Inc., 2001). However, seasonal water table fluctuations of several feet can be expected based on historical water-level observations at monitoring wells completed in the terrace aquifer at other locations on CAFB (Boggs et al., 1990). The aquifer receives direct recharge from infiltration of precipitation at ground surface. Groundwater in the terrace aquifer discharges to the underlying Eutaw-McShan aquifer, to contiguous Holocene-age alluvial deposits within the floodplain of the Tombigbee River to the west, and to local streams. Regional groundwater movement within the terrace aquifer is generally westward toward the Tombigbee River. However, groundwater movement in the project locality is at least partially directed toward the unnamed tributary to Stinson Creek, which is incised in the upper part of the terrace aquifer. Use of the terrace aquifer in the region is limited to small domestic and stock-watering supplies due to its limited thickness and variable water-bearing characteristics. The Mississippi State Department of Health (MSDH) - Division of Water Supply database on wells indicates none are completed in the terrace aquifer within one mile of the project sites (MSDH, 2000).

The Eutaw-McShan aquifer lies directly beneath the terrace aquifer in the project area. It primarily consists of interbedded glauconitic sands, silts, and clays having a total thickness of about 300 feet (Gandl, 1982). The aquifer dips to the southwest at about 25 to 30 feet/mile, and receives recharge at its outcrop/subcrop area along the Mississippi-Alabama border. The Eutaw-McShan aquifer is widely used in northeastern Mississippi for municipal, industrial, and domestic water supplies. It is the source of most of the active water-supply wells within a one mile of the proposed plant sites as indicated on Figure 3.7-1 and in Table 3.7-1. These wells range from 130 to 180 feet in depth, and all are designated as community use wells.

The Tuscaloosa Aquifer System (TAS) is comprised of four hydraulically connected regional aquifers; i.e., the Gordo, Coker, Massive Sand, and undifferentiated Lower Cretaceous sediments. These aquifers generally consist of interbedded sands, gravels, silts, and clays having an estimated composite thickness of about 500 feet in the site area (Wasson et al., 1965). The TAS dips to the southwest at about 35 to 40 feet/mile. The individual aquifers within the TAS receive recharge either at their outcrop/subcrop areas to the northeast or by leakage from adjacent over-lying or underlying aquifers (Strom and Mallory, 1995). The TAS is the primary source of large municipal and industrial well supplies in the region. Based on reported well depths, the MSDH database on wells suggests there are six TAS wells located within one mile of the two project sites (Table 3.7-1). Three of these wells are located on CAFB

and are currently inactive. Well depths range from 425 to 455 feet indicating these wells are probably completed in the Coker formation. The remaining three TAS wells, located south of the project sites, are 350 feet deep, suggesting these are completed in the Gordo formation.

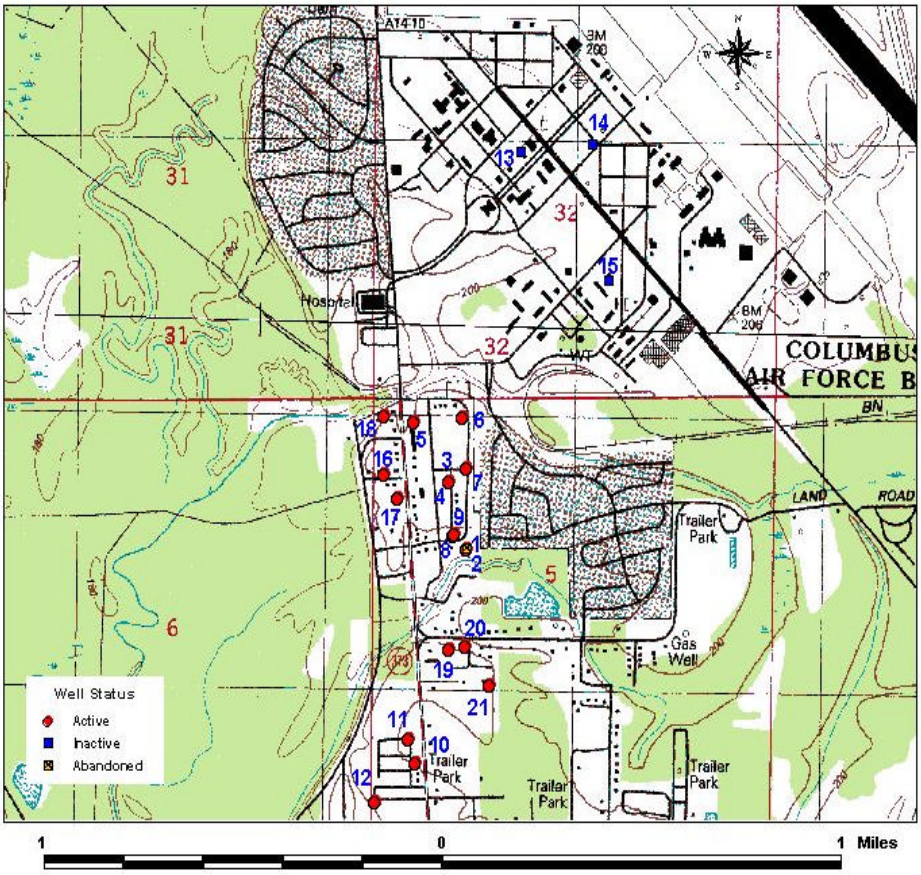

Figure 3.7-1
Groundwater Supply-Wells Locations

Table 3.7-1
Water-Supply Wells Within One Mile of Project Sites (Source: MSDH, 2000)

Map No.	Owner	Database Id. No.	Type[1]	Status[2]	Depth (ft)	Capacity[3] (gpm)	Aquifer
1	AIRBASE TRAILER PARK	440013-01	C	A	168	Nd	Eutaw-McShan
2	AIRBASE TRAILER PARK	440013-02	C	X	130	Nd	Eutaw-McShan
3	AIRBASE TRAILER PARK	440013-03	C	A	130	Nd	Eutaw-McShan
4	AIRBASE TRAILER PARK	440013-04	C	A	130	Nd	Eutaw-McShan
5	AIRBASE TRAILER PARK	440013-05	C	A	130	Nd	Eutaw-McShan
6	AIRBASE TRAILER PARK	440013-06	C	A	130	Nd	Eutaw-McShan
7	AIRBASE TRAILER PARK	440013-07	C	A	168	Nd	Eutaw-McShan
8	AIRBASE TRAILER PARK	440013-08	C	A	180	Nd	Eutaw-McShan
9	AIRBASE TRAILER PARK	440013-09	C	A	180	Nd	Eutaw-McShan
10	AIRBASE VILLAGE	440014-01	C	A	150	Nd	Eutaw-McShan
11	AIRBASE VILLAGE	440014-02	C	A	150	Nd	Eutaw-McShan
12	AIRBASE VILLAGE	440014-03	C	A	150	Nd	Eutaw-McShan
13	COLUMBUS AFB	440018-01	C	I	455	500	TAS (Coker)
14	COLUMBUS AFB	440018-02	C	I	425	480	TAS (Coker)
15	COLUMBUS AFB	440018-03	C	I	427	480	TAS (Coker)
16	PARKER'S MOBILE HOME PARK	440029-01	C	A	150	Nd	Eutaw-McShan
17	PARKER'S MOBILE HOME PARK	440029-02	C	A	150	Nd	Eutaw-McShan
18	PARKER'S MOBILE HOME PARK	440029-03	C	A	150	Nd	Eutaw-McShan
19	SMITH'S MOBILE HOME PARK	440087-01	C	A	350	Nd	TAS (Gordo)
20	SMITH'S MOBILE HOME PARK	440087-02	C	A	350	Nd	TAS (Gordo)
21	SMITH'S MOBILE HOME PARK	440087-03	C	A	350	Nd	TAS (Gordo)

[1]C = community use
[2]A = active, I = inactive, X = abandoned
[3]Nd = no data

3.8 Infrastructure and Utilities

3.8.1 Water Supply

Columbus Air Force Base receives water from the City of Columbus Water System, which obtains groundwater from eight water wells in the Eutaw aquifer. The city's distribution system has a design capacity of 14 million gallons per day (mgd) and a current operating usage of 5 mgd (USAF, 2001).

The mobile home park site currently receives water from local wells. However, East Lowndes Water Company would supply the Regenesys™ facility. This system has a design capacity of 7.6 mgd and a current operating usage of 3.5 mgd (Mitchell, 2001). It also takes water from the Eutaw-McShan and TAS aquifers.

3.8.2 Wastewater Treatment

Columbus Light and Water Department's wastewater treatment plant (WWTP) currently treats wastewater from the base. This mechanical plant has a design capacity of 10 mgd and treats an average of 6.25 mgd (USAF, 2001). The plant now discharges into Luxapillila Creek in Columbus. Sewer flow from the base increases as much as 50 percent during periods of rain due to damaged lines and cross connection with the storm water system. The base sewer line system is scheduled to be repaired in 2004 (USAF, 2001). Until June 1998, CAFB operated the WWTP that had been at the site of Alternative B. This WWTP was constructed in 1941 and is now demolished. The mobile home park at the Alternative A site now has only septic tanks for handling its domestic sewage. The Southgate Sewer Company would service the Regenesys™ facility, if located at this site. This plant uses sewage stabilization ponds and has a permitted capacity of 0.16 mgd. Current operating usage is 0.036 mgd. The facility ultimately discharges into the Tombigbee River.

3.8.3 Storm Water Management

CAFB has a Storm Water Pollution Prevention Plan (SWPPP) documenting existing storm water management practices at the base, and serving as a guide for base personnel to ensure that the potential for storm water contamination is minimized. On March 17, 1997, the Mississippi Department of Environmental Quality (MDEQ) issued the base a storm water permit (#MSR001351). The federal Clean Water Act (33 U.S.C. 121, et seq.) makes it illegal to discharge pollutants from a point source into navigable waters of the United States except in compliance with a permit.

Approximately 200,000 linear feet of storm drain lines collect storm water from nearly 500 inlets throughout the base. While most areas of the base drain to the Tombigbee River, the northeast portion drains to the Buttahatchie River. Total area of the base is 192,143,929 ft^2, with 2,338,110 ft^2 of buildings and structures. Based on these data, approximately 1.22 percent of the total base area is impervious cover (USAF, 2001).

Storm water from the mobile home park site drains to the north and northeast into the tributary to Stinson Creek, where it merges with storm water from the base and drainage from a nearby commercial area.

3.8.4 Solid Waste Management

In 1999, CAFB disposed of 1,663.48 tons of MSW, an average of 4.56 tpd. Of this total, 913.36 tons were generated from industrial operations and 750.12 tons from housing areas. Family housing residents separate recyclable materials and set them at the curbside for pickup by the MSW disposal contractor. Additionally, recycling bins are located around the base for customer drop-off. A total of 392 tons of MSW were recycled, which equates to 23.6 percent of the total MSW generated (USAF, 2001).

CAFB MSW is disposed of in the Golden Triangle Solid Waste Authority Landfill in Starkville, Mississippi. The facility has a permitted capacity in excess 30,000,000 cubic yards and an expected life span of 109 years. The landfill presently receives approximately 455 tons per day (Sloan, 2001).

The Golden Triangle Solid Waste Authority removes solid wastes generated at the mobile home park as well. There are 115 mobile homes in the park. At three pounds of solid waste produced per person per day (USAF, 2001), and an estimated average of two persons per mobile home, total weekly output is estimated as 4800 lb.

3.8.5 Transportation

The proposed sites for the Regenesys™ facility are located approximately 10 miles northwest of Columbus, Mississippi. Figure 3.8-1 is a map of the local road network for the area. The main access from Columbus to the vicinity of the sites is via US Highway 45 and State Route 373. US Highway 45 runs south from Jackson, Tennessee, to Mobile, Alabama. This highway is a high-quality, four-lane route with speed limits of 55 and 65 mph in the vicinity of the Air Force Base. State Route 373 intersects US Highway 45 approximately five miles south of the base and is a high- to mid-quality two-lane road north of the intersection. State Route 373 has a straight and level alignment, passing zones, and a speed limit of 45 mph. As State Route 373 approaches the south entrance gate, there are several residences and small businesses located along the roadway. In this area, there is a no passing zone and a reduced speed limit of 30 mph.

The mobile home park site (Alternative A) is located outside the south entrance gate on the east side of State Route 373. The wastewater treatment plant site (Alternative B) is just inside the south entrance gate on the west side of State Route 373.

If access through the south entrance gate were restricted, the wastewater treatment plant site could be accessed by turning east from State Route 373, approximately one mile south of the base onto Land Road, then back northwest onto Airbase Road, or by traveling north on US 45 to Airbase Road. Airbase Road leads to the east entrance gate of CAFB, and then base roadway C Street could be taken west to the site. Land Road is a two-lane secondary road which travels through a residential area, has numerous curves, narrow lane and shoulder widths, and no lane markings. Airbase Road is a high-quality, two-lane road with good land and shoulder widths, good alignment, and a 45-mph speed limit. It has a reduced speed limit on the Air Force Base and becomes a four-lane road separated by a median. The two-lane C-Street is typical of the roadways on the Air Force Base typically having good lane width, traffic markings, curbs and gutters, and speed limits of approximately 25-30 mph.

Immediate accessibility to the wastewater treatment plant site is assessed as moderate. An unpaved road is located in the vicinity of the site off Independence Avenue (State Route 373) inside the south gate. A portion of this road may be utilized for access to the site.

Immediate accessibility to the mobile home park site is via a tar and chip roadway. This roadway is in extremely poor condition with an excessive amount of potholes. An improved access road would be required for accessibility to this site.

Figure 3.8-1 also depicts traffic levels on the local road network. The 1999 Average Daily Traffic (ADT) report indicates that approximately 23,000 vehicles per day (vpd) travel on US Highway 45, south of State Route 373 and 6,000 vpd travel on State Route 373, south of the sites. Approximately 6,735 vehicles per workday enter and exit CAFB via the two gates. During the peak flow periods (7:20-7:30 a.m., 11:30 a.m.-12:15 p.m., and 4:15 - 4:25 p.m.), traffic is greater at the east gate primarily because of direct access to US Highway 45. However, total traffic volume over a 24-hour period is greater at the south gate (USAF, 2001). Current traffic levels are well within the capacity of the road system.

3.9 Earth Resources

3.9.1 Geology

The proposed project sites are located near the eastern boundary of the Gulf Coastal Plain within the Fall Line Hills (or Tennessee-Tombigbee River Hills) physiographic province (Brent et al., 1979). Although the Fall Line Hills unit is generally characterized by rugged, hilly topography, the project sites lie in a physiographically distinct part of the province where erosion and deposition by the Tombigbee River have produced broad, relatively flat terraces bordering the current floodplain. Surface elevations in the project site vicinity range from approximately 180 to 210 feet above mean sea level.

Plio-Pleistocene age terrace deposits associated with the Tombigbee River immediately underlie both of the proposed project sites. Terrace deposits consist of unconsolidated, lenticular sands and gravels with minor amounts of silt and clay. Total thickness of these sediments is estimated to be about 20 to 30 feet. Below the terrace deposits is a thick sequence of sedimentary deposits associated with the Mississippi Embayment, a southward plunging geosyncline that extends southward from western Kentucky to the Gulf of Mexico. The project sites are situated on the eastern flank of the Embayment; consequently, the underlying sediments dip and thicken to the southwest. These Cretaceous-age sediments generally consist of sand, gravel, clay, chalk, and marl of fluvial-deltaic, continental, and marginal-marine origin. Relevant geologic formations present beneath the site include, in descending stratigraphic order, the Eutaw-McShan, Gordo, Coker, Massive Sand, and undifferentiated Lower Cretaceous rocks (Strom and Mallory, 1995).

Figure 3.8-1 Local Transportation Map

3.9.2 Soils

CAFB soils are moderately well to poorly drained silt and clay loams of the Prentiss Roselia Steens and Cahaba Prentiss Guyton associations. These soils are characteristic of river terrace and floodplain deposits (USAF, 2001).

3.10 Hazardous Materials and Waste

3.10.1 Hazardous Materials

Hazardous materials (HMs) are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. Section 9601, et. seq.), as amended by the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 300-372), and the Toxic Substances Control Act (TSCA) (15 U.S.C. Section 2601, et seq.). The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901, et seq.), which was further amended by the Hazardous and Solid Waste Amendments (HSWA), defines hazardous wastes. In general, both hazardous materials and wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or to the environment when released or otherwise improperly managed (USAF, 2001).

Hazardous materials management at Air Force installations is established primarily by AFI 32-7080 (Air Force Instruction), Pollution Prevention Program. The AFI incorporates requirements of all federal regulations, other AFIs, and DoDDs, for the reduction of hazardous material uses and purchases. The hazardous materials addressed by the instruction include procurement of ozone depleting substances (ODSs) and of products containing the 17 chemicals listed under the voluntary 33/50 USEPA Industrial Toxics Program (EPA 17) (USAF, 2001).

Residents of the mobile home park may purchase cleaning supplies and other chemicals that contain constituents that are classified as hazardous materials but these quantities and purchases are not regulated. Typically, these purchases would be for personal use and the volumes would not be significant.

3.10.2 Hazardous Wastes

Unless otherwise exempted by CERCLA regulations, RCRA Subtitle C (40 CFR Parts 260 through 270) regulations are administered by the EPA and are applicable to the management of hazardous wastes. Hazardous waste (HW) must be handled, stored, transported, disposed, or recycled in accordance with these regulations. Treatment, storage, and disposal of toxic and hazardous wastes on a Department of Defense installation that is not owned by the Department of Defense is not permitted, except as provided in 10 U.S.C. Section 2692.

CAFB is registered with the EPA as a large quantity generator of HW. According to the CAFB Hazardous Waste Management Plan (HWMP), a total of 33 recurring hazardous waste streams have been identified (USAF, 2001).

In 1999, approximately 40,757 lb of HW from CAFB were transported for disposal (Hill, 2000). CAFB has reduced HW generation from a high of 143,116 lb in calendar year 1993 (USAF, 2001).

There are no measurable volumes of hazardous wastes stored on the mobile home park site. Small quantities of hazardous wastes may be produced, but consumers are generally exempt from regulatory disposal requirements.

3.11 Cultural, Archeological and Historical resources

The site of the former wastewater treatment plant has been highly disturbed by recent demolition of the plant and by the original plant construction. Thus, the presence of significant archaeological or historic resources at this site is very unlikely.

The mobile home park has experienced various ground-disturbing activities as well. Mobile homes in the park are not connected to a municipal sewer system; thus, various local septic tanks and septic lines have been installed. Road construction and previous activities have also disturbed the site. Thus, the potential for intact archaeological deposits is remote.

There are no historic sites or structures in the immediate vicinity of either proposed site. Waverly, a historic mansion, is located approximately 5 miles southwest of the proposed sites. Several antebellum homes are located approximately 10 miles south of the proposed sites in Columbus.

3.12 Biological Resources

3.12.1 Terrestrial and Equatic Ecology

The proposed sites occur within the East Gulf Coastal Plain section of the Coastal Plain physiographic province as described by Fenneman (1938). Botanically, the project area is in the Gulf Slope section of the Oak-Pine forest region recognized by Braun (1950). This is a transition region, within which the ranges of tree species from the northern central hardwood forests and the southeastern evergreen forests overlap. Throughout the area, the composition of these forests varies extensively in relation to topography, climate, and soils. Historically, forests of the region were characterized by a variety of evergreen and deciduous tree species, including shortleaf and yellow pines, blackjack, post and Spanish oaks, and hickories. Throughout the project area, loblolly pine is a frequent component of regenerating forests.

Field inspections of both proposed sites indicated that each is heavily disturbed and that little natural vegetation remains. The Alternative A site primarily consists of an open lawn that is routinely mowed and supports a mixture of native and introduced early successional herbaceous species. Although mixed stands of oaks and pine are present toward the eastern edge of this site, the understory vegetation in these areas is notably sparse and does not support extensive native plant communities. The CAFB site has been impacted extensively by the removal of infrastructure associated with the former wastewater treatment plant. More than 90 percent of this site consists of overturned soil and other debris. The remaining portions of this site consist of a mowed grass lawn with associated weed species such as mouse-ear cress, dandelion, and plantain. Alternative A site primarily consists of an open lawn that is routinely mowed and supports a mixture of native and introduced early successional herbaceous species. Although mixed stands of oaks and pine are present toward the eastern edge of this site, understory

vegetation in these areas is notably sparse and does not support extensive native plant communities. Vegetation characterizing both of these proposed project areas is common and representative of the region.

Introduced Plant Species

Vegetation characterizing both of the potential project sites consists of a mixture of native and introduced (i.e., non-native) herbaceous species. Although introduced species such as mouse-ear cress and dandelion have become naturalized in the project area, these species are not among those recognized as particularly invasive exotic plant species in neighboring states (Tennessee Exotic Pest Plant Council, 1996). The density of these introduced species, and the habitats in which they occur, are representative of similarly disturbed habitats in the surrounding region.

Aquatic Animals

According to the U.S. Fish and Wildlife Service (Lunceford, 2001), Stinson Creek, and the Tennessee-Tombigbee Waterway in the area contain moderate to high-quality warm water fisheries and provide essential habitat for migratory waterfowl and other water and wading birds.

3.12.2 Threatened and Endangered Species

Plants

A review of the TVA Regional Natural Heritage database indicated that no federally listed plant species are known from Lowndes County, Mississippi. However, 29 Mississippi state-listed plant species are known from Lowndes County. According to the TVA Heritage Database, five of these Mississippi state-listed plant species are known to occur within a five-mile radius of the proposed action (see Table 3.12-1). However, field inspections of the proposed project sites revealed suitable habitats for these and other rare plant species are not present.

Table 3.12-1
Federal- or State-listed Species
Known to Occur in a Five-Mile Radius of the Proposed Project Area

Common Name	Scientific Name	Federal Status	State Status
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered
Black-knobbed map turtle	*Graptemys nigrinoda*	None	Endangered
Clematis[1]	*Clematis beadlei*	None	NOST[2]
Evening primrose[1]	*Oenothera grandiflora*	None	NOST
Tickseed[1]	*Coreopsis auriculata*	None	NOST
Turkscap lily	*Lilium superbum*	None	NOST
Yellow parilla	*Menispermum canadense*	None	NOST

[1]This common name is often applied to more than one member of this genus.

[2]NOST - The Mississippi Natural Heritage Program does not assign status codes to state-listed species; this designation indicates the species is tracked by the Mississippi Natural Heritage Program due to its rarity in the state.

Aquatic Animals

The two proposed sites for this project are located adjacent to a tributary of Stinson Creek, which flows into the Tennessee-Tombigbee Waterway north of Columbus, Mississippi. Two fish species that have no official status, but are tracked by the Mississippi Natural Heritage program (i.e., the fluvial shiner [*Notropis edwardraneyi*] and the black redhorse [*Moxostoma duquesnei*]), have been reported from the Tennessee-Tombigbee Waterway near Stinson Creek. Several other state- and federal-listed species are thought to have been extirpated from this portion of the Tennessee-Tombigbee Waterway.

Several state- and federal-listed fish and mussel species are known from the Buttahatchie River, north of this project. However, these are not likely to occur within the area potentially affected by this project. The state endangered frecklebelly madtom (*Noturus munitus*) is known from Luxapallila Creek, south of the project area, but does not likely occur in the Tennessee-Tombigbee Waterway near the project area.

Terrestrial Animals

A review of the TVA Regional Natural Heritage database indicated that within Lowndes County, the following protected terrestrial animals are known to occur: one federal-listed species, two state-listed species, three species listed as uncommon by the Mississippi Natural Heritage Program, and six heron colonies. A more detailed review of the TVA Heritage database revealed that two protected terrestrial animal species are known to occur within a five-mile radius of the proposed facility. These are the bald eagle and the black-knobbed map turtle (see Table 3.12-1). However, field inspections of the proposed project sites revealed that suitable habitats for these and other rare terrestrial animal species are not present.

3.12.3 Wetlands

The mobile home park neither contains any wetland areas nor adjoins any wetland areas, as determined by a site visit on March 6, 2001. The wastewater treatment plant site is also an upland site and does not contain any on-site wetlands, as determined by the site visit. The site visit also determined there are no wetland areas along the unnamed, adjacent tributary to Stinson Creek in the vicinity of this site.

Away from the sites, there are extensive wetland areas associated with backwater areas and the floodplains of the Tombigbee and Buttahatchee Rivers.

3.13 Environmental Justice

3.13.1 Background

Environmental justice refers to the right to a safe and healthy environment for all and the conditions in which such a right can be freely exercised regardless of race, ethnicity, and socioeconomic status. On February 11, 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* This executive order directs certain federal agencies and requests others to consider environmental justice in the environmental reviews of their programs and activities to better ensure agency actions do not disproportionately impact minority or low-income populations. During an environmental justice analysis, minority or low-income populations in action-impact areas must be identified to determine whether, compared to other populations, these would experience a disproportionate negative impact by the action.

3.13.2 Minority and Low-Income Populations

According to the 2000 Census of Population, the population of Lowndes County is 44.0 percent minority. This is somewhat higher than the state average of 39.3 percent. Columbus Air Force Base is located in Census Tract 2, while the surrounding area is in Census Tract 1. In Census Tract 1, 24.9 percent of the population is minority, and in Census Tract 2, 26.7 percent. Most of this area is low density in population, except at the base.

Poverty and income data are not yet available from the 2000 Census of Population, so the only source of such data for census tracts is the 1990 Census of Population. At the county level, an estimate of people below the poverty level has been made for 1997 by the US Census Bureau (www.cache.census.gov/housing/saipe/estmod97/est97_ms.dat). This shows that Lowndes County had a poverty rate of 17.7 percent, while the state rate was slightly higher at 18.1 percent. According to the 1990 Census of Population, the Lowndes County poverty rate at that time was 22.1 percent. Tract 1 had a much lower rate of 14.8 percent, while Tract 2, which is the Columbus Air Force Base, had a very low rate of 3.2 percent.